

Claims

1. A roller chain drive system comprising:
 - a first sprocket;
 - a second sprocket;
 - a roller chain comprising a plurality of rollers drivingly engaged with said first and second sprockets, said roller chain defining a link pitch P_c , wherein:
 - at least one of said first and second sprockets is a random engagement sprocket comprising a first plurality of A-profile teeth formed with a first asymmetric profile and a second plurality of B-profile teeth formed with a second asymmetric profile that is different from said first asymmetric profile;
 - said A-profile teeth each define a first pressure angle;
 - said B-profile teeth each define a second pressure angle that is at least 5 degrees greater than said first pressure angle.
2. The roller chain drive system as set forth in claim 1, wherein said first pressure angle is at least negative three (-3) degrees but not more than ten (10) degrees.
3. The roller chain drive system as set forth in claim 2, wherein said second pressure angle is at least six (6) degrees but not more than twenty-three (23) degrees.
4. The roller chain drive system as set forth in claim 3, wherein said random engagement sprocket defines a sprocket chordal pitch P_s that is at least 0.2% less but not more than 1% less than said link pitch P_c of said chain.
5. The roller chain drive system as set forth in claim 4, wherein:
 - rollers of said roller chain seat in two-point driving contact with said A-profile teeth at seating locations B and C;
 - rollers of said roller chain seat in two-point driving contact with said B-profile teeth at seating locations B' and C;

said sprocket rotates about an axis (X);

said sprocket defines a first initial contact angle IC1 that lies between a first line that originates at said axis and passes through a center of a first roller seated in two-point driving contact with one of said A-profile teeth or one of said B-profile teeth and a second line that originates at said axis and passes through a center of a second roller at an instant of initial contact between said second roller and a successive A-profile tooth;

said sprocket defines a second initial contact angle IC2 that lies between said first line and a third line that originates at said axis and passes through a center of a third roller at an instant of initial contact between said third roller and a successive B-profile tooth; and,

$IC2 > IC1$.

6. The roller chain drive system as set forth in claim 5, wherein:

said second roller makes said initial contact with said successive A-profile tooth at a location A located radially outward from said roller seating location B; and,

said third roller makes said initial contact with said successive B-profile tooth at a location A' located radially outward from said roller seating location B'.

7. The roller chain drive system as set forth in claim 6, wherein:

said A-profile teeth and said B-profile teeth are interconnected by a root surface defined by a radius that is smaller than a minimum radius of said rollers of said roller chain so that a roller is prevented from contacting said root surface when bridging a tooth space defined between successive teeth.

8. The roller chain drive system as set forth in claim 1, wherein said at least one random engagement sprocket comprises a hub and wherein said first plurality of A-profile teeth and said second plurality of B-profile teeth project outwardly from said hub and define a ring of teeth that encircles said hub, said at least one random engagement

sprocket further comprising at least one resilient cushion ring secured to said hub adjacent said ring of teeth and adapted to dampen impact between said roller chain and said at least one random engagement sprocket.

9. The roller chain drive system as set forth in claim 8, wherein said at least one random engagement sprocket comprises first and second resilient cushion rings connected to said hub on opposite sides of said ring of teeth.

10. A roller chain sprocket comprising:

a first plurality of A-profile teeth formed with a first asymmetric profile and a second plurality of B-profile teeth formed with a second asymmetric profile that is different from said first asymmetric profile, wherein said A-profile teeth each define a first pressure angle and said B-profile teeth each define a second pressure angle that is at least 5 degrees greater than said first pressure angle.

11. The sprocket as set forth in claim 10, wherein said first pressure angle is at least negative three (-3) degrees but not more than ten (10) degrees.

12. The sprocket as set forth in claim 11, wherein said second pressure angle is at least six (6) degrees but not more than twenty-three (23) degrees.

13. The sprocket as set forth in claim 12, said sprocket defining a sprocket chordal pitch P_s that is at least 0.2% less but not more than 1% less than a link pitch P_c of an associated chain adapted to mesh with said sprocket.

14. The sprocket as set forth in claim 13, wherein:

said A-profile teeth define seating locations B and C for two-point seating of an associated roller;

said B-profile teeth define seating locations B' and C for two-point seating of an associated roller;

said sprocket is adapted to rotate about an axis (X);

said sprocket defines a first initial contact angle IC1 that lies between a first line that originates at said axis and passes through a center of a first associated roller seated in two-point driving contact with one of said A-profile teeth or one of said B-profile teeth and a second line that originates at said axis and passes through a center of a second associated roller at an instant of initial contact between the second associated roller and a successive A-profile tooth;

said sprocket defines a second initial contact angle IC2 that lies between said first line and a third line that originates at said axis and passes through a center of a third associated roller at an instant of initial contact between the third associated roller and a successive B-profile tooth; and,

$IC2 > IC1$.

15. The sprocket as set forth in claim 14, wherein:

said A-profile teeth are conformed so that the second associated roller makes said initial contact with said successive A-profile tooth at a location A located radially outward from said roller seating location B; and,

said B-profile teeth are conformed so that the third associated roller makes said initial contact with said successive B-profile tooth at a location A' located radially outward from said roller seating location B'.

16. The sprocket as set forth in claim 15, wherein:

said A-profile teeth and said B-profile teeth are interconnected by a root surface defined by a radius that is smaller than a minimum radius of the associated rollers of the associated roller chain so that associated rollers are prevented from contacting said root surface.

17. A roller chain sprocket adapted to mesh with an associated roller chain having rollers defining a minimum roller radius, said roller chain sprocket comprising:

a first plurality of A-profile teeth formed with a first asymmetric profile;

a second plurality of B-profile teeth formed with a second asymmetric profile that is different from said first asymmetric profile, wherein:

said A-profile teeth each define a first pressure angle and said B-profile teeth each define a second pressure angle that is at least 5 degrees greater than said first pressure angle; and,

a root surface is located between successive teeth of said sprocket, said root surface defined by a radius that is smaller than the minimum roller radius to prevent contact between said rollers and said root surface.